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Rabi Bhattacharya* (rabi@math.arizona.edu), Department of Mathematics, University of Arizona, Tucson, AZ 85721. *Role of Geometry in Model Independent Statistical inference on Non-Euclidean Spaces.*

This talk focuses on (1) differential geometric depictions of certain classes of digital images arising in biology, medicine, machine vision and other fields of science and engineering and (2) their model-independent statistical analysis for purposes of identification, discrimination and diagnostics. As examples we mention Kendall's landmarks based shape spaces, certain graphical models for evolutionary biology, and the space of diffusion matrices arising in diffusion tensor imaging. Nonparametric inference based on Fréchet means as minimizers of expected squared distances have been recently used effectively for such spaces M , which are either manifolds or stratified spaces. One may use geodesic distances on these spaces under appropriate Riemannian structures, or those induced by embeddings equivariant under the action of a large Lie group on M . We discuss general issues of uniqueness of the Fréchet minimizer and the consistency and asymptotic distribution of its empirical estimate under these distances. The asymptotic dispersion of the intrinsic sample mean is shown to be related to the curvature of M . We also consider the extension of nonparametric Bayesian methods to manifolds for purposes of classification, regression, density estimation. (Received August 16, 2014)